Daily GLOWBUGS

Digest: V1 #5

via AB4EL Web Digests @ SunSITE

Purpose: building and operating vacuum tube-based QRP rigs

[AB4EL Ham Radio Homepage @ SunSITE]

%%%%% GlowBugs %%%%% GlowBugs %%%%% GlowBugs %%%%% GlowBugs %%%%%

Subject: glowbugs V1 #5
glowbugs Saturday, April 12 1997 Volume 01 : Number 005

Date: Fri, 11 Apr 1997 14:22:01 -0500 (CDT)
From: mjsilva@ix.netcom.com (michael silva)
Subject: Re: Heising modulation and those chokes in AM/BC rigs

>...what usually dies due to transients is the
>modulation choke, far cheaper to replace. As the typical failure mode
>is a short to core, I've seen stations run 'em standing on a dozen
>shorty Coke bottles while awaiting a replacement--not a safe thing but
>it works.
>
> 73,
> --Bobbi
>
What a great image! Also another reason why Coke in the bottle is
better than Coke in the can...

73,
Mike, KK6GM

Date: Fri, 11 Apr 1997 14:43:45 -0500 (CDT)
From: mjsilva@ix.netcom.com (michael silva)
Subject: Core saturation musings

I sometimes get these wierd ideas, and the Heising modulation thread
did it to me again. Occasionally someone will ask about using a
transformer in place of a filter choke, or using a power transformer in
place of a modulation transformer. One of the reasons given that this
won't work well is that the power transformer design assumes little or
no DC component in the windings, while the choke and modulation
transformer will have a large DC component. So, for the sake of
discussion, what if we *do* use a power transformer in either of these

applications, and balance out the DC core component by running some DC thru an unused filament winding? We'd need to set the DC amount so that the ampere-turns of the two DC components were equal (and opposite). Note that this would take very little DC voltage/power, since the DC resistance of the winding will be quite low.

Now, is there any real reason to do this? I don't know. Chokes and especially modulation transformers are harder to get than many power transformers. Low voltage DC is cheap and easy to generate these days. Even with no DC core component a purpose-designed choke or modulation transformer would be expected to perform better than such a "hack". etc, etc.

As I said, presented for the sake of discussion...

73,
Mike, KK6GM

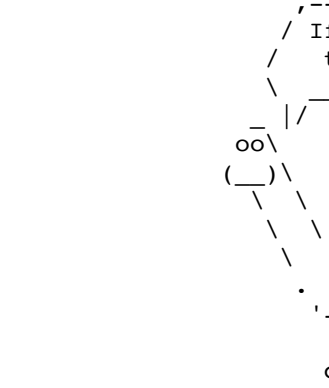
Date: Fri, 11 Apr 1997 13:32:01 -0700 (MST)
From: Chris Trask <ctrask@primenet.com>
Subject: This Is Just A Test

This is just a test to confirm that my postings are being echoed.

I gotta go.

Regards,

Chris



Circuit Design for the
RF Impaired

Chris Trask / N7ZWY
Principal Engineer
ATG Design Services
P.O. Box 25240
Tempe, Arizona 85285-5240

Email: ctrask@primenet.com

Graphics by Loek Frederiks

Date: Fri, 11 Apr 1997 13:58:18 PDT
From: "Jeff Duntemann" <jeffd@coriolis.com>
Subject: Re: Determining Choke Values

At 03:15 PM 4/11/97 -0400, KA1YRV wrote:
>I have several large power supply type chokes I've collected over the years.

>Problem is that I have no idea what the inductance values are. Is there any
>way to determine that without elaborate test gear?

LC meters are now no big deal, and you don't need ten significant figures of accuracy. I have a cheap little LCR meter that reads chokes to hundredths of a henry up to 200 henries. $89. Probably the second most useful piece of test gear I own, after my venerable Tek 465 scope.

If you have a frequency counter, you could lash up a simple oscillator with a cap of reasonable accuracy and measure the frequency, then do the numbers. That's pretty much what the cheap L meters do, I think. If I needed to do that I would create a little test box with two banana plugs coming out the back spaced to mate with the banana plugs on the front of my counter, and a couple of clip leads coming out the front to the choke.

A single 555 could do that, I'm pretty sure, since given the inductance of the chokes you're not going to be oscillating at RF.

- --73--

- --Jeff Duntemann KG7JF
Scottsdale, Arizona

Date: Fri, 11 Apr 1997 14:07:59 PDT
From: "Jeff Duntemann" <jeffd@coriolis.com>
Subject: Modulation transformers

Hi gang (shouldn't say "guys" anymore, in deference to Bobbi):

The recent interest in AM reminded me of the scarcity of modulation transformers for plate modulation, which (I'm sorry, it's just simple physics) beats every other method of AM hands down. I recall seeing something somewhere that a company (Peter Dahl?) makes custom modulation transformers. It would be interesting to see whether the company has any "stock" modulation transformers, or, failing that, what it would cost to get a group order together for ten or fifteen 50w or 100w modulation transformers.

I wouldn't mind paying $50 or $100 for a *good* 100w modulation transformer, because with it I could build a modulator that could modulate as much power as I would generally create in a home-made rig, and it would last me the rest of my life. There's no law says homebrewing has to be a shoestring thing. I have very little time to build this stuff, so I buy good parts and work carefully.

I actually scored a clean UTC S-19 for the classic Handbook 50w modulator, but I have my eyes on something capable of modulating a pair of 811As.

- --73--

- --Jeff Duntemann KG7JF
Scottsdale, Arizona

Date: Fri, 11 Apr 1997 16:55:32 +0100
From: BOB DUCKWORTH <bob@atl.org>
Subject: Re: Determining Choke Values

quick and crude

RL and 60Hz.
Voltage divider.
R of choke is small.

All you need is a vtvm, some resistors,
and a small transformer for the AC

If you want at 120Hz than
run it through a freq doubler
but don't forget where ground is :-)

- -bob

Date: Fri, 11 Apr 1997 17:00:23 -0500 (EST)
From: "Roberta J. Barmore" <rbarmore@indy.net>
Subject: Re: Ampltude Modulation

Hi, Steve & Glowbuggies!

Ummm, there is, living quietly in the bedroom closet of Pulse-Width Derived Amplitude Modulation, a small and sneaky boogeyman: You *must* filter out the pulse frequency, or it shows up as a set of serious big sidebands a goodly distance away from your carrier, much to the consternation of the people, kilocycles away from you, who are clobbered by 'em.

Trick is to pick a reasonably-high pulse rate--100kc or more--which will produce sidebands that will be attenuated somewhat by the tuned circuits in the output of the RF amp, then just stick a brute-force pi-section between plate of the modulator and cathode of the RF amp, using something like a high-value RF choke for the series L. You can push the cut-off freq to just above the highest AF--3kc for hardcore comms-grade, 12 or 15kc if you're after higher fi.

(Please note, the "ground" reference for the RF output tube effectively floats at half the supply voltage, if you've got the B- grounded the way most of us, including Harris, do it. You can DC-ground the B+ and run the modulator at way below ground if you prefer--that's how Collins did their version of the tube-output PWM transmitter! [I remain convionced that Jack Selmeyer, late of Collins Broadcast transmitter design team, does not see the world in quite the way most folks do--and his way often works better].)

Recent (solid-state, arrgh) PWM rigs have used a *really* fine trick to make filtering out the pulse freq easier: use four RF amps with the outputs parallel, each one with it's own modulator; all modulalators are running at the same pulse freq but the pulse are 90 degrees out of phase to each one! Resultant is 4X pulse freq, much easier to filter and far more attenuated by the RF tuned circuits. 'Spect an octet of 6L6s could sing this song--to the tune of a solid 100W or so!

Making the PWM itself, with which to drive the modulators, is easier with sand than glass--usual method is a comparator with triangle waves of the pulse freq on one input, and audio on the other; almost intuitively simple. A clever sort could do it with tubes but this is one case where I would have to vote for sand myself.

73,
--Bobbi

Date: Fri, 11 Apr 97 21:37:20 EDT
From: JOHN_SEHRING.parti@ecunet.org
Subject: CATHODE MODULATION

To: glowbugs@www.atl.org

Briefly, there are 2 main forms of AM modulation. With one the input power is varied in amplitude. With the other the operating efficiency of a Class C amp is varied.

Plate modulation is example of 1st type, screen grid modulation of 2nd.

Cathode modulation is combination of the two types. Part of applied modulation produces plate mod & part produces on RF grid circuit.

How much goes to each type depends on particular RF amp circuit used & can be varied.

Cathode mod does not require any extra or unusual parts over plate modulator.

Its advantage is the ability to combination plate/screen modulate with less power than straight plate modulation.

Quick way how to tell if it's being used: Tx final PA plate current & rx S-meter will swing upward with modulation.

-John Sehring (Fri, Apr 11, 1997 10:29 pm MT @Baker, Montana) UCC WB2EQG

Date: Fri, 11 Apr 1997 19:42:52 -0700 (MST)
From: Chris Trask <ctrask@primenet.com>
Subject: AM Modulation Techniques (fwd)

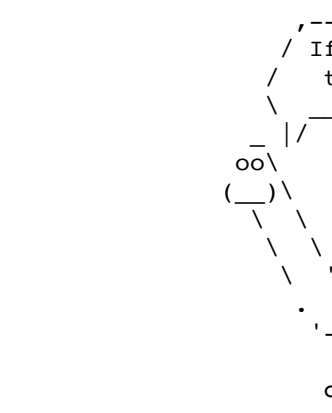
Having just read a GB mailing concerning Heising Modulation, I am reminded of yet another technique called "Screen Modulation," wherein the AM modulation is applied through a coupling transformer at the screen grid, rather than the plate. I once made a small transmitter as such with an 807 as the final and the AM applied through an interstage transformer. The transmitter operated at 620 kHz and was for a dormitory carrier-current station called WEHR at the Pennsylvania State University.

I believe that I learned about this technique in an older ARRL handbook, but for the life of me I can't remember which year.

I gotta go.

Regards,

Chris



Circuit Design for the
RF Impaired

Chris Trask / N7ZWY
Principal Engineer
ATG Design Services
P.O. Box 25240
Tempe, Arizona 85285-5240

Email: ctrask@primenet.com

Graphics by Loek Frederiks

Date: Sat, 12 Apr 1997 01:30:38 -0600 (MDT)
From: toyboat@freenet.edmonton.ab.ca
Subject: Re: AM Modulation Techniques (fwd)

On Fri, 11 Apr 1997, Chris Trask wrote:

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> reminded of yet another technique called "Screen Modulation," wherein the
> AM modulation is applied through a coupling transformer at the screen
> grid, rather than the plate. I once made a small transmitter as such
> with an 807 as the final and the AM applied through an interstage trans-
> former.

I have an interesting circuit that appears to use Suppressor-grid Modulation. It is likewise from the Brown and Kneitel book "101 Easy Ham Radio Projects".

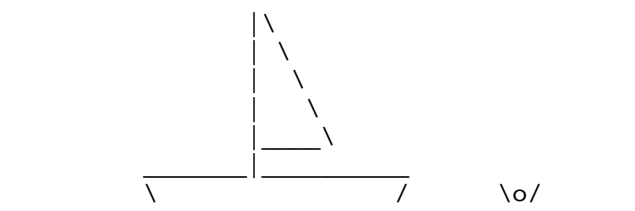
It's a one-tuber tri-tet oscillator, that was designed for 50 MHz. A carbon mike and audio output trafo in series with the suppressor grid positive supply voltage modulates directly. The screen is conventionally supplied with a series dropping resistor.

The idea looks like something that was revived from a 160 or 80 metre modulated oscillator from the thirties.

In this case it's only one watt output (6BH6). I suppose that's all that's practical with no amplifier at all in the modulator.

Regards,

Shane Wilcox



Shane <toyboat@freenet.edmonton.ab.ca>

Date: Sat, 12 Apr 1997 08:42:24 -0700
From: "Scott C. Gray" <scotgray@cwnet.com>
Subject: AM Modulation - Linear Amplification?

Got a interesting little AM "Linear amp" the other day. Homebrew - maybe garage operation production. Rather simple but unusual. Straight-foward single 6146 tuned input/output (yes 27 MHZ, soon to be changed!!) with a twist...

Twist? A 6AN8 is also included. Tetrode section is used as a receive amp, while a silicon (maybe germainum) diode rectifies the incoming audio component and is used to drive the Triode section through what appears to have been a audio output transformer from a BC receiver. This provides a variable voltage to the Screen of the 6146. The result is a very large "swing" in modulation. Resting carrier is as little as 5 watts with PEP measurements to 100 watts (at voice peaks). A pot is added to the Triode circuit to insert more voltage to the screen of the 6146 as desired (marked "Gain" on the front panel). Resuting increase in the screen causes the resting carrier to go up to about 35 watts.

Hmmm, controlled carrier linear amplification? At leat the tube runs cool! Lets the power supply loaf a bit too.

Would like to try this on a single 811 or 572? Any ideas?

Scott KD6CQ

Date: Sat, 12 Apr 1997 15:15:35 +0000
From: "Brian Carling (Radio G3XLQ / AF4K)" <bry@mnsinc.com>
Subject: Re: Modulation transformers

But Jeff, for $50-100 you can generally pick up a good boatanchor xmtr at a hamfest and take the mod xfmr out of it and still have a lot of other good parts too!

Anything you buy from DAHL is not going to be cheap I can tell you. They make great xfmrs, and will rewind/rebuild others.

I also need a good mod xfmr here for a 100-500 watt AM station if anyone can help!

On 11 Apr 97 at 14:07, Jeff Duntemann spoke about Modulation transformers and said:

> Hi gang (shouldn't say "guys" anymore, in deference to Bobbi):
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> The recent interest in AM reminded me of the scarcity of modulation
> transformers for plate modulation, which (I'm sorry, it's just
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> --73--
>
> --Jeff Duntemann KG7JF
> Scottsdale, Arizona
>
>

Date: Sat, 12 Apr 1997 15:15:36 +0000
From: "Brian Carling (Radio G3XLQ / AF4K)" <bry@mnsinc.com>
Subject: Re: Core saturation musings

Er Mike - how is running DC through the filament winding supposed to affect the other HV windings? What am I overlooking here?

On 11 Apr 97 at 14:43, michael silva spoke about Core saturation musings and said:

> I sometimes get these wierd ideas, and the Heising modulation thread
> did it to me again. Occasionally someone will ask about using a
> transformer in place of a filter choke, or using a power transformer
> in place of a modulation transformer. One of the reasons given that
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> Mike, KK6GM
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>
****
*** 73 from Radio AF4K / G3XLQ in Gaithersburg, MD USA *
** E-mail to: bry@mnsinc.com   *
*** See the great ham radio resources at: *
** http://www.mnsinc.com/bry/   *
****

Date: Sat, 12 Apr 1997 15:15:36 +0000
From: "Brian Carling (Radio G3XLQ / AF4K)" <bry@mnsinc.com>
Subject: Re: AM Modulation - Linear Amplification?

Scott is there any way you could make us a copy of the schematic of
that thing?

How does it sound on the air?

Even a hand-drawn schematic/circuit diagram would be most helpful to
us. I can scan either one and put it out on the web for all to see.

Thanks - Bry

On 12 Apr 97 at 8:42, Scott C. Gray spoke about AM Modulation -
Linear Amplificatio and said:

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****

Date: Sat, 12 Apr 1997 14:46:35 -0500 (EST)
From: "Roberta J. Barmore" <rbarmore@indy.net>
Subject: Re: Modulation transformers

Hi, Jeff & Glowbugs gang!

One FB workaround for modulation transformers is to use a pair of big AF output jobs. If you use the multimatch type, it will accomodate most anything you'd want to modulate...and you can run a low-Z line to between modulator & RF by locating one of 'em at the RF PA. (Use fat wire!)

It's not cheap--AES sells a Hammond 100W job for $190. :(However, 100W of audio will modulate 200W of RF, unless I'm suffering serious brain-fade and all my old notes are wrong. So a 100W rig wants a 50W modulator, for which you can get a transformer for $140 or so. Hunt up an old hi-fi amp and you may only need *one* transformer. (Eico HF-20s used to show up a lot at 'fests. It's just P-P 6L6s, and has more inverse feedback than we'd need, so you could probably get the output up to 30W or more by cranking back the degeneration. Don't push it too far, the power supply won't be happy. Putting the heaters on a seperate xfr will help unload the original power xfr a bit).

Unless the transformer is *designed* for single-ended use, it might be wise to buy a big Hammond choke and not run plate DC though the ex-hi-fi transformer. Between that and the fact that AF transformer ratings are generally CCS, not ICAS, you can likely push the dickens out of 'em, and get away with a (~$100) 30W or 25W unit running at 100W--at your own risk, natcherly. ;) Sink one in a vat of non-PCB transformer oil and you can *really* get away with awful things; in the 1930s Millen reported seeing a very small mod transformer set up that way perking away at 10X rated power. (This last trick is *majorly* at your own risk and will involve putting ceramic feedthroughs in the lid of a gallon paint can or some such--a "Cansformer?")

Haven't seen any prices from Peter Dahl and will be interested to see what folks discover there. I don't expect any great surprises, as Dahl makes a first-rate product and prices are commeasurate. It's money well spent, though. Do it right and you'll only ever need to buy one!

73,
--Bobbi

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End of glowbugs V1 #5
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AB4EL Ham Radio Homepage @ SunSITE

Created by **Steve Modena, AB4EL**
Comments and suggestions to **modena@SunSITE.unc.edu**
